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**Reply to****Department of Federal Affairs**

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Fayetteville, GA

August 29, 2013

The Honorable Mignon L. Clyburn  
Acting Commissioner  
Federal Communications Commission  
445 12<sup>th</sup> Street SW  
Washington, DC 20054

The Honorable Dr. Margaret A. Hamburg  
Commissioner  
U.S. Food and Drug Administration  
10903 New Hampshire Avenue  
Silver Spring, MD 20993

Dear Acting Chairwoman Clyburn and Commissioner Hamburg:

The American Academy of Pediatrics (AAP), a non-profit professional organization of 60,000 primary care pediatricians, pediatric medical sub-specialists, and pediatric surgical specialists dedicated to the health, safety and well-being of infants, children, adolescents, and young adults appreciates this opportunity to comment on the Proposed Rule "Reassessment of Exposure to Radiofrequency Electromagnetic Fields Limits and Policies" published in the Federal Register on June 4, 2013.

In the past few years, a number of American and international health and scientific bodies have contributed to the debate over cell phone radiation and its possible link to cancer. The International Agency for Research on Cancer (IARC), part of the United Nations' World Health Organization, said in June 2011 that a family of frequencies that includes mobile-phone emissions is "possibly carcinogenic to humans." The National Cancer Institute has stated that although studies have not demonstrated that RF energy from cell phones definitively causes cancer, more research is needed because cell phone technology and cell phone use are changing rapidly. These studies and others clearly demonstrate the need for further research into this area and highlight the importance of reassessing current policy to determine if it is adequately protective of human health.

As radiation standards are reassessed, the AAP urges the FCC to adopt radiation standards that:

- **Protect children's health and well-being.** Children are not little adults and are disproportionately impacted by all environmental exposures, including cell phone radiation. Current FCC standards do not account for the unique vulnerability and use patterns specific to pregnant women and children. It is essential that any new standard for cell phones or other wireless devices be based on

protecting the youngest and most vulnerable populations to ensure they are safeguarded throughout their lifetimes.

- **Reflect current use patterns.** The FCC has not assessed the standard for cell phone radiation since 1996. Approximately 44 million people had mobile phones when the standard was set; today, there are more than 300 million mobile phones in use in the United States. While the prevalence of wireless phones and other devices has skyrocketed, the behaviors around cell phone uses have changed as well. The number of mobile phone calls per day, the length of each call, and the amount of time people use mobile phones has increased, while cell phone and wireless technology has undergone substantial changes. Many children, adolescents and young adults, now use cell phones as their only phone line and they begin using wireless phones at much younger ages. Pregnant women may carry their phones for many hours per day in a pocket that keeps the phone close to their uterus. Children born today will experience a longer period of exposure to radio-frequency fields from cellular phone use than will adults, because they start using cellular phones at earlier ages and will have longer lifetime exposures. FCC regulations should reflect how people are using their phones today.
- **Provide meaningful consumer disclosure.** The FCC has noted that it does not provide consumers with sufficient information about the RF exposure profile of individual phones to allow consumers to make informed purchasing decisions. The current metric of RF exposure available to consumers, the Specific Absorption Rate, is not an accurate predictor of actual exposure. AAP is supportive of FCC developing standards that provide consumers with the information they need to make informed choices in selecting mobile phone purchases, and to help parents to better understand any potential risks for their children. To that end, we support the use of metrics that are specific to the exposure children will experience.

The AAP supports the reassessment of radiation standards for cell phones and other wireless products and the adoption of standards that are protective of children and reflect current use patterns. If you have questions, please contact Clara Filice in the AAP's Washington Office at 202/347-8600.

Sincerely,

A handwritten signature in cursive script that reads "Thomas K. McInerney".

Thomas K. McInerney, MD FAAP  
President

TKM/cf

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December 12, 2012

The Honorable Dennis Kucinich  
2445 Rayburn House Office Building  
Washington, DC 20515

Dear Representative Kucinich:

On behalf of the American Academy of Pediatrics (AAP), a non-profit professional organization of 60,000 primary care pediatricians, pediatric medical subspecialists, and pediatric surgical specialists dedicated to the health, safety and well-being of infants, children, adolescents, and young adults, I would like to share our support of H.R. 6358, the *Cell Phone Right to Know Act*.

The AAP strongly supports H.R. 6358's emphasis on examining the effects of radiofrequency (RF) energy on vulnerable populations, including children and pregnant women. In addition, we are pleased that the bill would require the consideration of those effects when developing maximum exposure standards. Children are disproportionately affected by environmental exposures, including cell phone radiation. The differences in bone density and the amount of fluid in a child's brain compared to an adult's brain could allow children to absorb greater quantities of RF energy deeper into their brains than adults. It is essential that any new standards for cell phones or other wireless devices be based on protecting the youngest and most vulnerable populations to ensure they are safeguarded through their lifetimes.

In addition, the AAP supports the product labeling requirements in H.R. 6358. These standards will ensure consumers can make informed choices in selecting mobile phone purchases. They will also enable parents to better understand the potential dangers of RF energy exposure and protect their children.

On July 24, the U.S. Government Accountability Office (GAO) published a report on federal cell phone radiation exposure limits and testing requirements. The GAO noted that the Federal Communications Commission's (FCC) most recent data indicates that the number of estimated mobile phone subscribers has grown from approximately 3.5 million in 1989 to approximately 289 million at the end of 2009. Cell phone use behaviors have also changed during that time. The quantity and duration of cell phone calls has increased, as has the amount of time people use mobile phones, while cell phone and wireless technology has undergone substantial changes. Many more people, especially adolescents and young adults, now use cell phones as their only phone line, and they begin using wireless phones at much younger ages.

Despite these dramatic changes in mobile phone technology and behavior, the FCC has not revisited the standard for cell phone radiation exposure since 1996. The current FCC standard for maximum radiation exposure levels is based on the heat emitted by mobile phones. These guidelines specify exposure limits for hand-held wireless devices in terms of the Specific Absorption Rate (SAR), which measures the rate the body absorbs radiofrequency (RF). The current allowable SAR limit is 1.6 watts per kilogram (W/kg), as averaged over one gram of tissue. Although wireless devices sold in the United States must ensure that they do not exceed the maximum allowable SAR limit when operating at the device's highest possible power level, concerns have been raised that long-term RF energy exposure at this level affects the brain and other tissues and may be connected to types of brain cancer, including glioma and meningioma.

In May 2011, the International Agency for Research on Cancer (IARC), the United Nations' World Health Organization's (WHO) agency promoting international cancer research collaboration, classified RF energy as "possibly carcinogenic to humans." In addition, the National Cancer Institute has stated that although studies have not definitively linked RF energy exposure from cell phones to cancer, more research is required to address rapidly changing cell phone technology and use patterns.

This and other research identified by the GAO demonstrates the need for further research on this issue, and makes clear that exposure standards should be reexamined.

The GAO concluded that the current exposure limits may not reflect the latest research on RF energy, and that current mobile phone testing requirements may not identify maximum RF energy exposure. The GAO proposed that the FCC formally reassess its limit and testing requirements to determine whether they are effective. The AAP commends the activities proposed under H.R. 6358, as they would address this research gap and improve consumer knowledge and safety. Establishing an expanded federal research program as the basis for exposure standards will ensure that consumer protections incorporate the latest research. Currently, the National Institute of Health (NIH), the only federal agency the GAO identified as directly funding research on this topic, provided approximately \$35 million from 2001 to 2011. Given this previous funding level, the AAP supports the \$50 million per fiscal year for seven years that H.R. 6358 would authorize.

The AAP appreciates your recognition of the need for new research and standards for mobile phone radiation, and is pleased to support H.R. 6358. For further assistance, please do not hesitate to contact Sonya Clay, Assistant Director, Department of Federal Affairs, at 202-347-8600 or [sclay@aap.org](mailto:sclay@aap.org).

Sincerely,

A handwritten signature in dark ink, reading "Thomas K. McInerney". The signature is fluid and cursive, with the first name "Thomas" and last name "McInerney" clearly legible.

Thomas K. McInerney, MD, FAAP  
President



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# AAP responds to study showing link between cell phone radiation, tumors in rats

Melissa Jenco, News content editor

Some rats developed tumors after being exposed to cell phone radiation, according to preliminary results of a study released Thursday.

In light of the findings, the Academy continues to reinforce its recommendation that parents should limit use of cell phones by children and teens.

“They’re not toys. They have radiation that is emitted from them and the more we can keep it off the body and use (the phone) in other ways, it will be safer,”



said Jennifer A. Lowry, M.D., FAACT, FAAP, chair of the AAP Council on Environmental Health Executive Committee.

The [study by the National Toxicology Program](#), part of the National Institute of Environmental Health Sciences, exposed rats to radiofrequency radiation for nine hours a day for two years beginning in utero and compared them to rats that were not exposed. Some of the male rats developed malignant tumors in their hearts and brains while the control group did not, according to the report, which included only partial findings.

Dr. Lowry, chief for the Section of Clinical Toxicology at Children's Mercy Hospital, said it is difficult to translate the results in rats to humans, and exposure was heavier than it would be for most people.

In *Pediatric Environmental Health, 3rd Edition*, the Academy recommends “exposures can be reduced by encouraging children to use text messaging when possible, make only short and essential calls on cellular phones, use hands free kits and wired headsets and maintain the cellular phone an inch or more away from the head.” The book also warns against talking on the phone or texting while driving.

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## We recommend

Study: 3% of young children have high blood lead levels  
Melissa Jenco et al., AAP News , 2016

AAP Conference Preview: Environmental health expert to tackle tough questions  
Carla Kemp et al., AAP News , 2016

NCE Preview: Environmental health expert to tackle tough questions  
Carla Kemp et al., AAP News , 2016

Pesticides and Kids: An AAP Report  
James Roberts, MD, MPH, et al., Medscape , 2013

AAP: No Amount of Lead Exposure Is Safe for Children  
PracticeUpdate , 2016

Cell Phones and Cancer: Is There a Connection?  
Bret Stetka, MD, et al., Medscape , 2011

Keeping Children Home Is Often Not Justified



Healthy Children (/English) > Safety & Prevention (<https://www.healthychildren.org/English/safety-prevention>) > All Around (<https://www.healthychildren.org/English/safety-prevention/all-around>) > Cell Phone Radiation & Children's Health: What Parents Need to Know

## SAFETY & PREVENTION

# Cell Phone Radiation & Children's Health: What Parents Need to Know

Children are not just little adults; their growing minds and bodies make them uniquely vulnerable to the effects of the environment around them, including cell phone radiation. Because technology is being adopted by children at younger ages than ever before, it's even more important to investigate if cell phone usage is a health hazard.



## What is cell phone radiation, anyway?

There are two types of radiation: ionizing and non-ionizing.

- **Ionizing radiation** (e.g., x-rays, radon, sunlight) is high frequency (and high energy).
- **Non-ionizing** is low frequency (low energy) radiation.

Cell phones have non-ionizing radiation. Your phone sends radio frequency waves from its antenna to nearby cell towers. When you make a call, text, or use data, your phone receives radio frequency waves to its antenna from cell towers.

## What does the latest research say?

Several studies have been done to find out if cell phone use can lead to cancer. These types of studies in people have not shown clear evidence of an increased cancer risk with cell phone use. While there was a slight increase in a type of brain tumor, called a glioma, in a small group of people who spent the most total time on cell phone calls in one study, other studies have not found this to be true.

In May 2016, the US National Toxicology Program, which is part of the National Institutes of Health (NIH), released partial findings from a two-year study (<http://biorxiv.org/content/early/2016/05/26/055699>) that exposed rats to the types of radio frequency radiation that cell phones give off and compared them with a non-exposed group. Some rats developed cancerous tumors after being exposed to the radiation—showing a potential connection between exposure to radiation and an increased risk of cancer.

## A few words of caution about this study:

- This study was only done on rats. While rats can be good test subjects for medical research, they are not the same as humans. We do not yet know if the same results would occur in people.
- The rats were exposed to very large amounts of radiation—nine hours a day, seven days a week, for two years. This is far more than most people spend holding their cell phones.
- More male rats developed cancerous tumors after being exposed to the radiation than female rats. Some of the rats who developed tumors lived longer than the control group rats that were not exposed to radiation.
- The analysis of all of the data from this study is not yet complete.

## Why is more research needed?

Parents should not panic over the latest research, but it can be used as a good reminder to limit both children's screen time (/English/family-life/Media/Pages/Media-Time-Family-Pledge.aspx) and exposure from cell phones and other devices emitting radiation from electromagnetic fields (EMF) (/English/safety-prevention/all-around/Pages/Electromagnetic-Fields-A-Hazard-to-Your-Health.aspx). Partial findings from studies like this one give scientists reason to look into the issue more. **The American Academy of Pediatrics (AAP) supports more research into how cell phone exposure affects human health long term, particularly children's health.**

## How can we limit cell phone radiation for ourselves and our children?

**The AAP reinforces its existing recommendations on limiting cell phone use for children and teenagers.** The AAP also reminds parents that cell phones are not toys, and are not recommended for infants and toddlers (/English/family-life/Media/Pages/Tablets-and-Smartphones-Not-for-Babies.aspx) to play with.

### Cell phone safety tips for families:

- Use text messaging when possible, and use cell phones in speaker mode or with the use of hands-free kits.
- When talking on the cell phone, try holding it an inch or more away from your head.
- Make only short or essential calls on cell phones.
- Avoid carrying your phone against the body like in a pocket, sock, or bra. Cell phone manufacturers can't guarantee that the amount of radiation you're absorbing will be at a safe level.
- Do not talk on the phone or text while driving (/English/ages-stages/teen/safety/Pages/Sample-Driving-Rules-Teens-Must-Follow.aspx). This increases the risk of automobile crashes.
- Exercise caution when using a phone or texting while walking or performing other activities. "Distracted walking" injuries are also on the rise.
- If you plan to watch a movie on your device, download it first, then switch to airplane mode while you watch in order to avoid unnecessary radiation exposure.
- Keep an eye on your signal strength (i.e. how many bars you have). The weaker your cell signal, the harder your phone has to work and the more radiation it gives off. It's better to wait until you have a stronger signal before using your device.
- Avoid making calls in cars, elevators, trains, and buses. The cell phone works harder to get a signal through metal, so the power level increases.
- Remember that cell phones are not toys or teething items.

## Are there any regulations in place to limit cell phone radiation in the United States?

The Federal Communications Commission (FCC) decides how much radiation cell phones are allowed to give off in the US. Currently, the FCC limit is at 1.6 W/Kg. The FCC, however, has not revised the standard for cell phone radiation since 1996, and a lot has changed since then.

- There are now more cell phones in the United States than there are people.
- The number of cell phone calls per day, the length of each call, and the amount of time people use cell phones has increased.
- Cell phone and wireless technology have had huge changes over the years. For example, how many cell phone models have you had since 1996?

Another problem is that the cell phone radiation test used by the FCC is based on the devices' possible effect on large adults—not children. Children's skulls are thinner and can absorb more radiation.

### Where the AAP stands:

**The AAP supports the review of radiation standards for cell phones in an effort to protect children's health, reflect current cell phone use patterns, and provide meaningful consumer disclosure.** Providing parents with information about any potential risks arms them with the information they need to make informed decisions for

their families. The AAP advocates for more research into how cell phone exposure affects human health long term, particularly children's health.

## Additional Information & Resources:

- Cell Phones: What's the Right Age to Start? (/English/family-life/Media/Pages/Cell-Phones-Whats-the-Right-Age-to-Start.aspx)
- Parents of Young Children: Put Down Your Smartphones (/English/family-life/Media/Pages/Parents-of-Young-Children-Put-Down-Your-Smartphones.aspx)
- Cell Phones (<http://www.niehs.nih.gov/health/topics/agents/cellphones/>) (National Institute of Environmental Health Sciences)
- Cell Phones and Cancer Risk Fact Sheet (<http://www.cancer.gov/about-cancer/causes-prevention/risk/radiation/cell-phones-fact-sheet>) (National Cancer Institute)

**Last Updated** 6/13/2016

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ie HONcode standard for trustworthy health (<http://www.healthonnet.org/HONcode/Conduct.html>)

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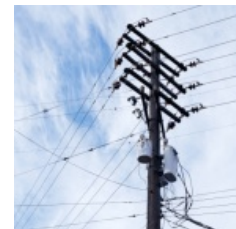
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#### SAFETY & PREVENTION

## Electromagnetic Fields: A Hazard to Your Health?

### Household Appliances:

For most people, their highest magnetic field exposures come from using household appliances with motors, transformers, or heaters.



- If a parent is concerned about electric and magnetic field exposure from appliances, identify the major sources of exposure and limit a child's time near those appliances.
- Manufacturers have reduced magnetic field exposures from electric blankets (since 1990) and from computers (since the early 1990s).
- Because magnetic fields decline rapidly with increasing distance, an easy measure is to increase the distance between children and the appliance.

### Power Lines:

A Massachusetts study published back in 1993 showed a significant association between proximity to power lines and depressive symptoms; that is, people who were able to see the towers from their house or yard were nearly 3 times more likely than those living farther away to experience depression. A Finnish study done a few years later confirmed a much higher risk of severe depression among those living within 100 yards of a power line.

There remains some degree of uncertainty in the literature on electric and magnetic field exposure and developing cancer (/English/health-issues/conditions/cancer/Pages/default.aspx). This uncertainty should be considered in the context of the low individual risk and the comparable environmental risks (eg, traffic accidents) in other locations.

Obtaining magnetic field measurements in the home sometimes will show that field levels are at approximately the average level despite proximity to the power line.

### Cell Phones:

In recent years, concern has increased about exposure to radio frequency electromagnetic radiation emitted from cell phones and phone station antennae. An Egyptian study confirmed concerns that living nearby mobile phone base stations increased the risk for developing:

- Headaches (/English/health-issues/conditions/head-neck-nervous-system/pages/Headaches.aspx)
- Memory problems
- Dizziness (/English/health-issues/conditions/head-neck-nervous-system/Pages/Dizziness-and-Fainting-Spells.aspx)
- Depression (/English/health-issues/conditions/emotional-problems/pages/Childhood-Depression-What-Parents-Can-Do-To-Help.aspx)
- Sleep problems

Short-term exposure to these fields in experimental studies have not always shown negative effects, but this does not rule out cumulative damage from these fields, so larger studies over longer periods are needed to help understand who is at risk. In large studies, an association has been observed between symptoms and exposure to these fields in the everyday environment.

**Last Updated** 11/21/2015

**Source** Adapted from Pediatric Environmental Health, 3rd Edition (Copyright © American Academy of Pediatrics 2011)

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Jennifer Lowry, MD  
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Director of MAPEHSU  
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Pediatrician, Department of Pediatrics  
Children's Mercy Hospital  
[jlowry@cmh.edu](mailto:jlowry@cmh.edu)

October 27, 2016

Dear Dr. Jennifer Lowry,

We were delighted to learn that based on the cancer findings from the National Toxicology Program (NTP) study on cell phone radiofrequency radiation (RFR), the American Academy of Pediatrics has reconfirmed its recommendation to limit exposure of children and teenagers to cell phones and other devices that emit RFR. However, along with that recommendation were four statements that downplayed the significance of the results from the NTP study. We are referring to the [Healthy Children.org AAP webpage with Ten Cell Phone Safety Tips](#).

Our comments provided below are intended to provide clarification on the reliability of available data on cancer risks associated with exposure to cell phone RFR. Based on the accumulating scientific evidence of increased cancer risk from cell phone RFR, it is necessary that health agencies and individuals promote precautionary measures now rather than waiting for absolute proof of human harm.

**Statement 1:** *"While there was a slight increase in a type of brain tumor, called a glioma, in a small group of people who spent the most total time on cell phone calls in one study, other studies have not found this to be true."*

**Response:** In their evaluation of the cancer risk of radiofrequency radiation, an expert working group of the International Agency for Research on Cancer (IARC) noted that brain cancer risks were increased significantly after 10 years of use, and risk levels were greatest on the side of the head on which users held their cell phones. Risks of glioma and acoustic neuroma were increased significantly in the multicenter Interphone case-control study as well as in pooled case control studies of Northern European countries that were included in the Interphone study, and in case control studies by Hardell et al. in Sweden<sup>12345678</sup>. The classification of RFR as a possible human

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<sup>1</sup> Schoemaker, M. J., Swerdlow, A. J., Ahlbom, A., Auvinen, A., Blaasaas, K. G., Cardis, E., ... & Klaeboe, L. (2005). Mobile phone use and risk of acoustic neuroma: results of the Interphone case-control study in five North European countries. *British Journal of Cancer*, [93\(7\), 842-848](#).

carcinogen by IARC was based on “positive associations observed between exposure to radiofrequency radiation from wireless phones and glioma, and acoustic neuroma,” and for which a causal relationship was considered to be credible<sup>89</sup>. Those associations were not considered to represent “sufficient evidence of carcinogenicity” at that time because recall bias in the case-control studies could not be fully ruled out as a possible contributing factor.

Since the IARC classification additional published studies indicate an association with increased tumor formation<sup>1011121314</sup>.

**Statement 2:** “*This study (NTP) was only done on rats. While rats can be good test subjects for medical research, they are not the same as humans. We do not yet know if the same results would occur in people.*”

The findings of brain tumors (gliomas) and malignant Schwann cell tumors of the heart in the NTP study, as well as DNA damage in brain cells of exposed animals, present a major public health concern because these tumors occurred in the same types of cells that had been reported to develop into tumors (gliomas and acoustic neuromas) in epidemiological studies of adult cell phone users.

Carcinogenicity studies in rodents are useful for several important reasons: (1) animals and humans exhibit similarities in biological processes of disease induction (that is why animal models are used in preclinical trials of new pharmaceutical agents), (2) it is unethical to intentionally expose humans to agents in order to test for adverse health effects such as cancer, (3) every agent that is known to cause cancer in humans is carcinogenic in animals when

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<sup>2</sup> Lahkola, A., Auvinen, A., Raitanen, J., Schoemaker, M. J., Christensen, H. C., Feychting, M., ... & Tynes, T. (2007). Mobile phone use and risk of glioma in 5 North European countries. *International Journal of Cancer*, [120\(8\), 1769-1775](#).

<sup>3</sup> INTERPHONE Study Group. (2010). Brain tumour risk in relation to mobile telephone use: results of the INTERPHONE international case-control study. *Int. J. Epidemiol*, [39\(3\), 675-94](#).

<sup>4</sup> INTERPHONE Study Group. (2010). Supplementary Material - Brain tumour risk in relation to mobile telephone use: results of the INTERPHONE international case-control study. *Int. J. Epidemiol*, [39\(3\), 675-94](#).

<sup>5</sup> INTERPHONE Study Group. (2011). Acoustic neuroma risk in relation to mobile telephone use: results of the INTERPHONE international case-control study. *Cancer Epidemiol*, [35, 453-64](#).

<sup>6</sup> Cardis, E. et al. (2011). Risk of brain tumours in relation to estimated RF dose from mobile phones: results from five Interphone countries. *Occup. Environ. Med*, [68\(9\), 631-40](#).

<sup>7</sup> Hardell L., Carlberg M., & Hansson M.K. (2011). Pooled analysis of case-control studies on malignant brain tumours and the use of mobile and cordless phones including living and deceased subjects. *Int J Oncol*, [38\(5\):1465-74](#).

<sup>8</sup> Han, Y. Y., Kano, H., Davis, D. L., Niranjan, A., & Lunsford, L. D. (2009). Cell phone use and acoustic neuroma: the need for standardized questionnaires and access to industry data. *Surgical neurology*, [72\(3\), 216-222](#).

<sup>9</sup> International Agency for Research on Cancer. (2011). IARC classifies radiofrequency electromagnetic fields as possibly carcinogenic to humans. *Press release*, [\(208\)](#).

<sup>9</sup> IARC Working Group on the Evaluation of Carcinogenic Risks to Humans. (2013). Non-ionizing radiation, Part 2: Radiofrequency electromagnetic fields. *IARC monographs on the evaluation of carcinogenic risks to humans/World Health Organization, International Agency for Research on Cancer*, [102\(2\), 1-460](#).

<sup>10</sup> Coureau, G. et al. (2014). Mobile phone use and brain tumours in the CERENAT case-control study. *Occup Environ Med*, [71\(7\), 514-22](#).

<sup>11</sup> Lerchl, A., Klose, M., Grote, K., Wilhelm, A. F., Spathmann, O., Fiedler, T., ... & Clemens, M. (2015). Tumor promotion by exposure to radiofrequency electromagnetic fields below exposure limits for humans. *Biochemical and biophysical research communications*, [459\(4\), 585-590](#).

<sup>12</sup> Hardell, L., & Carlberg, M. (2015). Mobile phone and cordless phone use and the risk for glioma—Analysis of pooled case-control studies in Sweden, 1997–2003 and 2007–2009. *Pathophysiology*, [22\(1\), 1-13](#).

<sup>13</sup> Hardell, L., Carlberg, M., Söderqvist, F., & Mild, K. H. (2013). Case-control study of the association between malignant brain tumours diagnosed between 2007 and 2009 and mobile and cordless phone use. *International Journal of Oncology*, [43\(6\), 1833-1845](#).

<sup>14</sup> Hardell, L., & Carlberg, M. (2013). Using the Hill viewpoints from 1965 for evaluating strengths of evidence of the risk for brain tumors associated with use of mobile and cordless phones. *Reviews on environmental health*, [28\(2-3\), 97-106](#).

adequately tested (IARC, preamble), (4) almost one-third of human carcinogens were identified after carcinogenic effects were found in well-conducted animal studies, (5) animal studies can eliminate the need to wait for a high incidence of human cancers (which may clinically manifest as much as 30 years from time of first exposure) before implementing public health-protective strategies, and (6) the control of exposure conditions in animal studies can eliminate the potential impact of confounding factors on the interpretation of study results.

**Statement 3:** *“The rats were exposed to very large amounts of radiation—nine hours a day, seven days a week, for two years. This is far more than most people spend holding their cell phones.”*

**Response:** While the exposure limit to RFR by the Federal Communications Commission is 0.08 W/kg averaged over the whole body, the localized exposure limit is 1.6 W/kg averaged over any one gram of tissue. For cell phone users, body tissues located nearest to the phone’s antenna receive higher exposures than tissues located distant from the antenna. Thus, when an individual holds a cell phone next to his or her head, exposure to the brain will be much higher than exposures averaged over the whole body. When considering organ-specific risk (e.g., risk to the brain) from cell phones, the important measure of exposure is the 1.6 W/kg value. Cell phone manufacturers provide values for their phone’s emissions. Many cell phones emit radiation that can produce local doses near 1.6 W/kg. In the NTP study in which animals were exposed to 1.5, 3, and 6.0 W/kg RFR, exposures in the brain were within 10% of the whole body exposure levels. Therefore, with respect to exposures to the brain, exposures of rats to RFR were similar to or slightly higher than human exposures from cell phones held next to the head.

Experimental carcinogenicity studies are generally conducted in small groups of rodents (approximately 50 animals of each sex and species per exposure or control group), and incidence values of adverse effects are used to assess health risks to potentially millions of exposed people. While an increased incidence of 1% in an experimental study would not be statistically significant, such an increase or even an increase in brain cancer risk of 0.001% in the general population would be dreadful; this concern is particularly pertinent for cell phones as there are more than 250 million cell phone users in the US and more than 4 billion users worldwide. Thus, to identify a hazardous agent, exposure levels in animal studies are often much higher than human exposures, while lower doses are included for analyses of dose-response relationships and assessments of human health risks. The NTP study of RFR could not use exposure intensities much higher than that of cell phones in order to prevent any measurable increases in body temperature. Consequently, the duration of exposure was extended to nine hours a day to determine whether cell phone radiation could cause adverse health effects and to provide data to characterize dose-response relationships for any detected effect and to assess human risk.

**Statement 4:** *“More male rats developed cancerous tumors after being exposed to the radiation than female rats. Some of the rats who developed tumors lived longer than the control group rats that were not exposed to radiation.”*

While the incidence of brain tumors and schwannomas of the heart was greater in exposed male rats than in female rats, these rare and uncommon tumors were observed only in RFR exposed

animals of both sexes with none observed in the controls. In addition, pre-cancerous lesions (glial hyperplasia and Schwann cell hyperplasia) were observed only in RFR exposed male and female rats. Observing numerical differences in response between the sexes is common in animal carcinogenicity studies as well as in human populations. For example, brain cancer mortality rates are approximately 50% higher in men than in women, and for many human cancers (e.g., colon-rectal, liver, soft tissue including heart, kidney, non-Hodgkin lymphoma, etc.) the incidence and mortality rates are much higher in men than in women. The different response rate between male and female rats in the RFR study does not alter the relevance of the cancer findings from this study.

The criticism that exposed rats lived longer than control rats, which might have affected the tumor findings, is an inaccurate portrayal and interpretation of the data for at least two reasons. First, there was no statistical difference in survival between control male rats and the exposure group with the highest rate of gliomas and heart schwannomas (male rats exposed to CDMA modulated RFR at 6 W/kg). Second, no glial cell hyperplasias (potential pre-cancerous lesions) or heart schwannomas were observed in any control rat, even though glial cell hyperplasia was detected in a CDMA-exposed rat as early as week 58 and heart schwannomas were detected as early as week 70 in exposed rats during the 2-year study. Thus, survival was sufficient to detect tumors or pre-cancerous lesions in control male rats. The exclusive findings of these tumors and pre-cancerous lesions in exposed animals support the carcinogenic potential of RFR in living organisms.

We hope these comments are helpful to you as the AAP develops future recommendations to protect children from adverse effects of RFR. It is also important to note that actively used cell phones are not the exclusive source of exposure to RFR, other sources of daily exposures include cell phones powered on even when not communicating, Wi-Fi devices, cordless phones and cell towers. Babies, toddlers and preschoolers are handed iPads and tablets as toys to play games and watch movies on. Many young children engage in wireless streamed content through devices resting on their laps, yet parents are unaware such Wi-Fi connectivity results in radiofrequency exposure to their bodies.

For children, health risks may be greater than that for adults because of greater penetration and absorption of cell phone radiation in the brains of children and because the developing nervous system of children is more susceptible to tissue damaging agents.

Sincerely,

Ron Melnick PhD

Senior Toxicologist and Director of Special Programs in the Environmental Toxicology Program at the National Institute of Environmental Health Sciences (NIEHS), National Institutes of Health, now retired.

Devra Davis, PhD MPH

President and Founder [Environmental Health Trust](#)

Visiting Professor Hebrew University Hadassah Medical Center

# Does Cell Phone Use Cause Brain Cancer? What the New Study Means For You

Groundbreaking study reveals the strongest link yet between cell phone radiation and cancer. Important advice for all consumers.

By Jeneen Interlandi

May 27, 2016

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The [results of a new study](#) by the National Toxicology Program—the largest and most expensive study of its kind—show a link between cell phone radiation and cancer in rats.

For many people, these findings likely raise questions and concerns about the safety of devices that we now carry with us nearly all the time.

Consumer Reports health and safety experts, who have long been concerned about the potential risks of cell phones and urged precautions when using them, say the new study supports that caution.

"Consumers don't need to stop using their phones," says Michael Hansen, Ph.D., a senior scientist with Consumer Reports who has studied this issue for years. "But there are some simple, common-sense steps you can and should take to reduce your exposure."

Specifically, Consumer Reports recommends that you:

- Try to keep the cell phone away from your head and body. Keeping it an arm's distance away significantly reduces exposure to the low-level radiation it emits. This is particularly important when the cellular signal is weak—when

your phone has only one bar, for example—because phones may increase their power then to compensate.

- Text or video call when possible, because this allows you to hold the phone farther from your body.
- When speaking, use the speakerphone on your device or a [hands-free headset](#).
- Don't stow your phone in your pants or shirt pocket. Instead, carry it in a bag or use a belt clip.

Below, answers to other basic questions about the study and what it means for you and your family.

## So What Did This New Study Find?

The [study](#) found that male rats had a higher incidence of two kinds of tumors when exposed to the same type of radiation emitted by cell phones.

The results are not conclusive, and the overall relevance to human cell phone use is something that's "not currently completely worked out," said John Bucher, Ph.D., associate director of the NTP, part of the National Institutes of Health.

But the [new report](#) adds weight to human epidemiological studies that have previously raised similar concerns, and when combined with those earlier studies, is poised to force a reconsidering among federal agencies of the potential risks posed by cell phones. "In my experience," Bucher said, "the people who have reviewed our findings agree with the findings."

A spokesman for CTIA, a trade group for the wireless industry, says "Numerous international and U.S. organizations, including the U.S. Food and Drug Administration, World Health Organization, and American Cancer Society, have determined that the already existing body of peer-reviewed and published studies shows that there are no established health effects from radio frequency signals used in cellphones."

## Why Should I Be Worried About a Study Using Rats?

Animal studies are actually the gold standard for determining cancer risk, for several reasons.

For one, it is unethical to expose humans to suspected carcinogens in a lab setting.

Second, studies in animals such as rats and mice can be completed much more quickly than they can be in humans, simply because their lifespans are so much shorter than ours. For example, the new NIH study involved exposing the rodents to cell phone radiation for just two years.

Finally, animal studies can validate results of previous observational studies in humans. Those studies, which track large groups of people over time, can look for associations between how many hours people said they used cell phones every day and the incidence of cancers in those people, but they can't prove a cause and effect relationship. Laboratory studies in rats, showing that exposure to cell phone radiation can cause cancers compared to a similar non-exposed group of rats, give credence to the results of observational human studies, and point strongly to cause and effect.

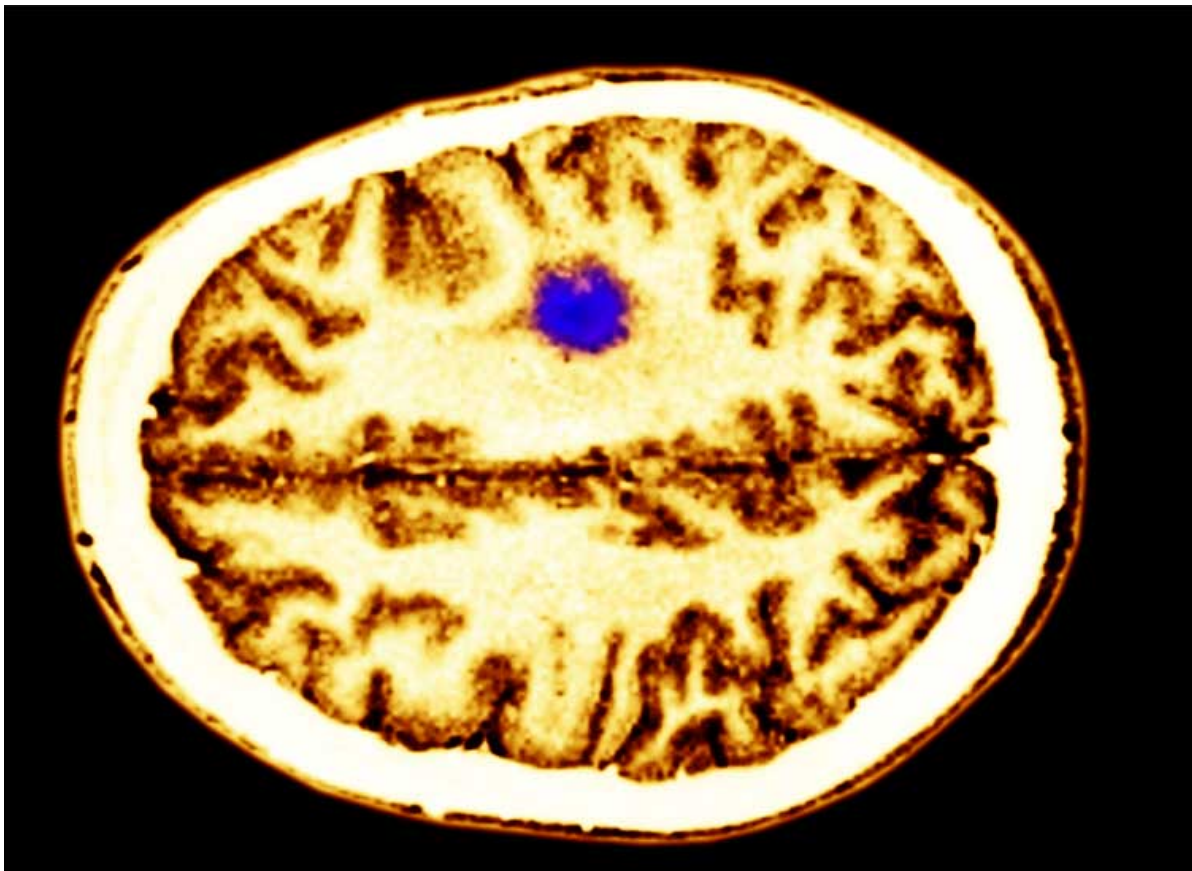
## What Do Studies in Humans Show?

The current animal studies are worrisome precisely because they do line up with the results of some previous observational studies in humans.

Last year, [Consumer Reports reviewed that research](#), focusing on five large population studies that investigated that question. Together the studies included more than a million people worldwide, comparing cell phone users with nonusers.

Three of the studies—one from Sweden, another from France, and a third that combined data from 13 countries—suggest a connection between heavy cell phone use and gliomas, the same kind of tumors detected in the new NIH study. Those tumors are usually cancerous and often deadly.

One of those studies also hinted at a link between cell phones and acoustic neuromas (noncancerous tumors); that kind of tumor is related to the second cancer detected in the current study, malignant schwannoma of the heart.



This MRI shows a possible glioma in a human brain. The NIH study suggests cell phones radiation could cause that kind of cancer in rats.

## How Might Cell Phone Radiation Cause Cancer?

Scientists [previously thought](#) that the radiation from cell phones might damage cells by heating human tissue. At high power levels radiofrequency waves—the kind emitted by cell phones—can heat up water molecules. Since human tissue is mostly water, scientists hypothesized that those waves might cause damage by heating.

The Federal Communications Commission’s cell phone emission test—which all cell phones must pass before being allowed on the market—is based on that principle.

But in 2011, scientists at the NIH found that low level radiation, held close to the head, could alter brain cells without raising body temperatures. Likewise, in 2015, German researchers reported that the same type of radiation emitted by cell phones could promote the growth of brain tumors in mice without raising body temperatures.

The NTP study controlled for heating effects by making sure that the body temperatures of exposed rats did not increase by more than 1° C (1.9° F), suggesting that the cancers were triggered by some other mechanism.

**Read our previous coverage about the potential dangers of radiation from [cell phones](#) and [CT scans and X-rays](#).**

## How Well Does the NTP Study Mimic Current Cell Phone Usage?

The study used specially designed chambers that allowed researchers to expose rodents to standardized doses of radiation. The rodents were exposed for nine hours total each day, at intervals of 10 minutes on, 10 minutes off, for two years.

The radiation frequencies and signal modulation used were the same used by 2G (GSM or CDMA) phones, which were standard when the study began. Newer cell phones use 3G (such as UMTS or CDMA-2000) or 4G (LTE), which may have lower power outputs and different signal modulation.

“These changes may be a critical difference in whether there is a hazard today,” says Consumer Reports’ Hansen. “But the study raises enough concern with the older technologies that we recommend an additional study be done with current technology.”

The rodents were exposed over their entire bodies. While that’s obviously different than the way humans use cell phones, the rodent results are still revealing, Hansen says.

“The reason we see schwannomas in the heart here, and not the auditory system, could be due to the fact that in rodents the heart is closer to the surface of the body,” he says. “What’s more important is that the cell type found in the heart in the NTP study is the same as in some brain tumors found in several human epidemiology studies.”

## What Does Consumer Reports Think the Government and Industry Should Do Now?

The substantial questions and concerns raised by this and previous research regarding cell phones and cancer requires swift and decisive action by the government and industry. Specifically, Consumer Reports believes that:

- The National Institutes of Health should commission another animal study using current cell phone technology to determine if it poses the same risks as found in this new study.
- The Federal Communications Commission should update its requirements for testing the effect of cell phone radiation on human heads. The agency's current test is based on the devices' possible effect on large adults, though research suggests that children's thinner skulls mean they may absorb more radiation. The FCC should develop new tests that take into account the potential increased vulnerability of children.
- The Food and Drug Administration and the FCC should determine whether the maximum specific absorption rate of 1.6 W/kg over a gram of tissue is an adequate maximum limit of radiation from cell phones.
- The Centers for Disease Control and Prevention should repost it's advice on the potential hazard of cell phone radiation and cautionary advice that was taken down in August 2014.
- Cell phone manufacturers should prominently display advice on steps that cell phone users can take to reduce exposure to cell phone radiation.